

**PUBLIC UTILITY MODEL DISCLOSURE S60-124622**

(19) Japanese Patent Office (JP)

(12) Public Utility Model Disclosure Bulletin (U)

(11) Public Utility Model Disclosure Bulletin No.: S60-124622

(43) Disclosure Bulletin Date: August 22, 1985

(51) Int. Cl. Identification Code JPO File No.  
B 01 D 46/00 7636-4D

Request for Examination: NO, (Total Pages: )

(54) Title of the Device: An Air Cleaner with Interior Honeycomb Element

(21) Utility Model Application No.: S59-13769

(22) Application Date: January 31, 1984

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*Specifications*1. *Title of the Device*

An air cleaner with interior honeycomb element

2. *Utility Model Claims*

An air cleaner with interior honeycomb element wherein a cylindrical honeycomb element is the interior design in cylindrical air inflow and air outflow housings, in the air cleaner which holds said honeycomb element sandwiched with a fastening device furnished on said inflow and outflow housings, the honeycomb element which is covered by a rigid light case of light material on the outside is inserted into a take-up device where liquid fills the middle of several cylindrical protrusions of large diameter by an elastic hollow ring cylinder and said cylinder, the above-mentioned honeycomb element and take-up device forms the interior of the housing of the outflow side furnished with ring-form pressure receiver and several brackets and of the housing of the inflow side furnished with a pressure exerting part and several brackets, and with a fastening device on said several brackets.

3. *Detailed Description of the Device***BEST AVAILABLE COPY**

This device concerns an air cleaner with interior honeycomb, particularly in regard improvement of the honeycomb element.

Figure 1 is a cross-sectional view of the air cleaner [A] wherein a conventional honeycomb [B] is the interior. In this example, a honeycomb element [E] is placed in the interior between a cylindrical inflow housing [C] having an air inflow opening [B] and a cylindrical outflow housing [F] having an air outflow opening [D], as shown in the figure, on one end of said honeycomb element [E], a packing [P<sub>1</sub>] is [illegible] on the flange part [K] of an element guide [G] equipped on the air inflow opening [B], a fastening device [R] which tightens several brackets [Q<sub>1</sub>, Q<sub>2</sub>] is provided on the inflow and outflow housings [C, F], and said flange [K] is attached by exerted pressure of packing checks [M, N] equipped on said inflow and outflow housings [C, F]. On the outer [illegible] of the element guide [L] of the other end of the honeycomb element [E] tape, for example, is wound at nearly the same diameter as the inner diameter of the outflow housing [F] forming a packing [P<sub>2</sub>] so as to contact the inside of the outflow housing [F]. The honeycomb element [E], however, has a low precision roundness and it is difficult to keep the packing [P<sub>2</sub>] round and, when the packing [P<sub>2</sub>] is thick, because the honeycomb element [E] is inserted into the outflow housing [F], the packing [P<sub>2</sub>] is inserted in a thin situation.

Figure 2 is an enlargement of the round frame of Fig. 1; the element guide [G] consists of a ring-form flat board [H], a ring-form board [J], and a flange [K]; as described above, when there is space between the packing [P<sub>2</sub>] and the inside of the outflow housing [F], during the operation of the air cleaner by engine revolution the honeycomb element [E] has a fixed stub [S] of the flange [K] of the element guide [G] as a fulcrum causing a swing and, as shown in Fig. 2, a crack arises in the fixed stub [S] from which [illegible] which is sucked in passes through: thus, the defect that when the crack becomes larger the honeycomb element [E] move from side to side in the housing.

To correct the above-mentioned defect, the present device consists of a honeycomb element which is covered by a rigid thin housing of light material on the outside is inserted into a take-up device where liquid fills the middle of several cylindrical protrusions of large diameter by an elastic hollow ring cylinder and said cylinder, the above-mentioned honeycomb element and take-up device forms the interior of the housing of the outflow furnished with ring-form pressure receiver and several brackets and of the housing of the inflow furnished with a pressure exerting part and several brackets, and, fastened with a fastening device on said several brackets, the form of said take-up device is changed to add pressure to the liquid and, adding pressure to the outer circumference of the honeycomb, said element is stabilized: this will be described below by the drawing of the embodiment.

Figure 3 is a cross-sectional drawing to describe the assembly of the air cleaner [20] according to the present device.

The honeycomb element [10] [illegible] by [illegible] a flat plate filter medium and [illegible]-form filter medium not shown in the figure to a spindle [5], attaches its end as a stopper, and is a cylinder forming and opening [7] and closure [8] alternately to the flow route [6]; further, on the outer

circumference a light case [9] is attached as an outer covering of a rigid light material such as aluminum, hard plastic, etc.

The honeycomb element [10] is inserted into a take-up device [11] filled with liquid [14] such as oil or silicon (shown in Fig. 3 & 5) in the middle of several protrusions [13] of large diameter from a hollow ring-form cylinder [12] and said cylinder [12] made of an elastic material such as rubber as shown in the oblique angle drawing of Fig. 4. As shown in Fig. 3, the honeycomb element [10] and take-up device [11] are inserted until they contact the stopper [15] of the central opening fixed to the outflow housing [4] which has the air outflow opening [3]; then, the cylinder in the direction attached to the bracket [21] of the inflow housing [2] with the air inflow opening [1] is inserted into the other end of said honeycomb element [10].

At the above-mentioned time, there is a space between the outer circumference of the center ring-form cylinder [12] of the take-up device [11] and the inner circumference of the outflow housing [4] and both ends of the ring-form protrusion [13], by just contacting the ring-form pressure exerting face [17] of the pressure exerting part [16] of the inflow housing [2] and the ring-form pressure receiving face [16] of outflow housing [4], pressure does not operate upon the liquid [14] in the take-up device [11]. To describe the action of the present device, Figure 5 is cross-sectional drawing of when a fastening device [23] such as a hanger bolt is fastened which [illegible] several brackets [21, 22] (two dotted lines below a fixed contact) which are fixed to the inflow and outflow housings [2,4]. When the ring-form stopper [19] furnished on the input housing [2] contacts the bracket [22], as the ring-form protrusion [13] of the take-up device touches by pressure exertion, there is no capacity of the liquid [14] and the elastic take-up device [11] is modified by the pressure of the liquid [14]. This is, by the fastening force of the fastening device [23] the ring-form protrusion [13] of the take-up device [11] is squeezed between the ring-form pressure exerting face [17] and the pressure receiving face [18] and the hollow ring-form cylinder [12] is squeezed while pressure is exerted on the light case cylinder [9] of the honeycomb element [10], stopper [15], and inside of the outflow housing [4]. By the above, the honeycomb element [10] which [illegible] the rigid thin housing [9] is fixed by the pressure of the liquid [14] inside the take-up device [11] between the ring-form pressure exerting face [17] and the stopper [15].

As described above, because the elastic light case attaches to the outer circumference of the honeycomb element, being inserted into the elastic take-up device filled with liquid, said honeycomb element and take-up device are inserted into the inflow housing providing a pressure exerting part and the outflow housing providing a fixed stopper, and the honeycomb element is fixed when there is a pressure change on the said take-up device by the fastening device of the bracket [illegible] fixed on the inflow and outflow housings, the present device takes care of the fault of the conventional product; further, when loosening the fastening device for honeycomb element cleaning, the take-up device returns to its original form, thus it has the effect of being able to be used for a long time.

4. *A Brief Description of the Figures*

Figure 1 is a cross-section drawing to describe a conventional product.

Figure 2 is an enlarged round frame drawing of Fig. 1.

Figure 3 is a cross-section drawing when the present device is assembled.

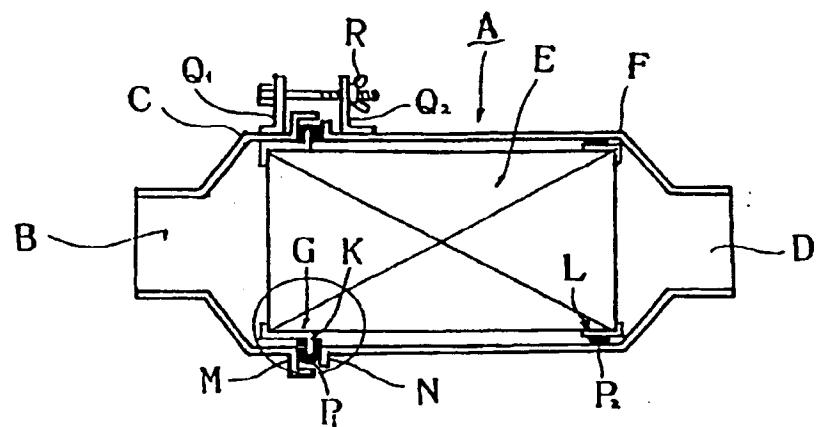
Figure 4 is an oblique-angle view of the take-up device.

Figure 5 is cross-section drawing to describe the fastening of the present device.

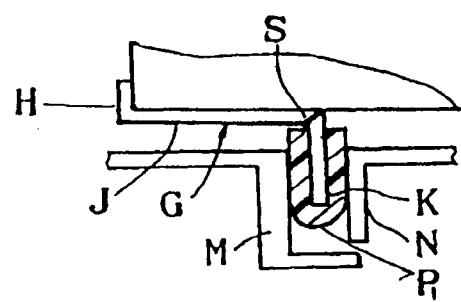
- 2 ... ... inflow housing
- 4 ... ... outflow housing
- 9 ... ... light case
- 10 ... ... honeycomb element
- 11 ... ... take-up device
- 12 ... ... hollow reing-form cylinder
- 13 ... ... reing-form protrusion
- 14 ... ... liquid
- 15 ... ... stopper
- 17 ... ... ring-form pressure exertion face
- 20 ... ... air cleaner
- 21 ... ... inflow bracket
- 22 ... ... outflow bracket
- 23 ... ... fastening device

Utility Model [illegible]    Applicant              Saturn Manufacturing Co.

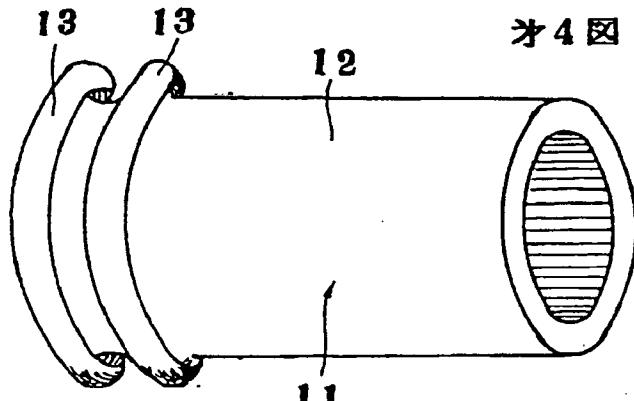
考1図



考2図



考4図



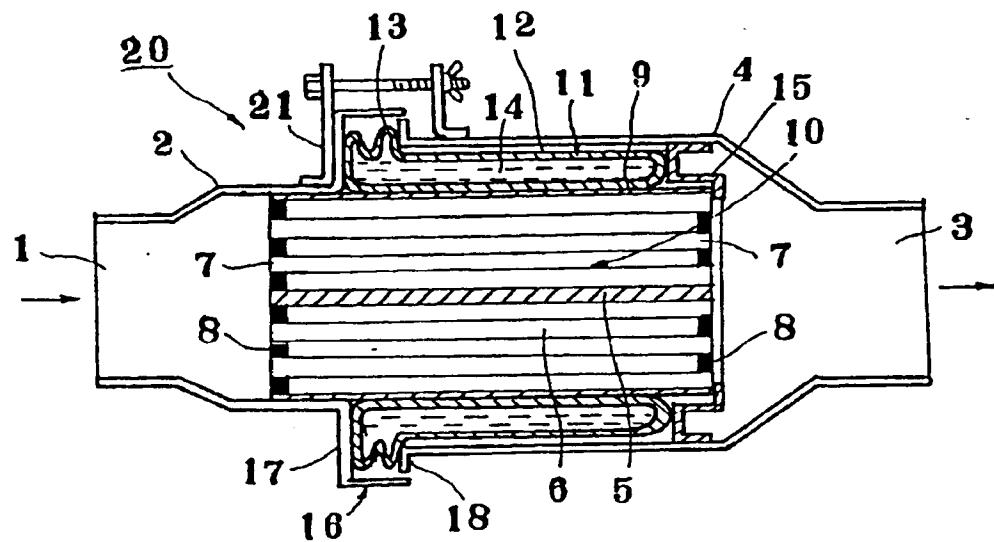
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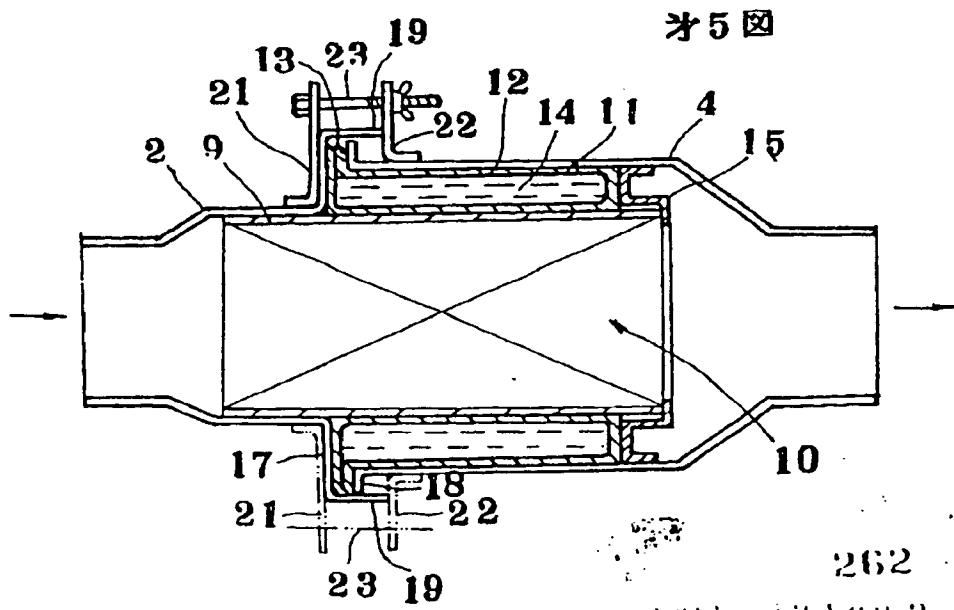
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第3図



第5図



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⑩日本国特許庁 (JP)

⑪実用新案出願公開

⑫公開実用新案公報 (U) 昭60-124622

⑬Int.Cl.<sup>1</sup>  
B 01 D 46/00

識別記号

厅内整理番号  
7636-4D

⑭公開 昭和60年(1985)8月22日

審査請求 未請求 (全頁)

⑮考案の名称 ハニカムエレメント内装のエアクリーナ

⑯実 願 昭59-13769

⑰出 願 昭59(1984)1月31日

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## 明細書

## 1. 考案の名称

ハニカムエレメント内装のエアクリーナ

## 2. 実用新案登録請求の範囲



円筒状のエアの流入側ケースおよびエアの流出側ケースに円筒状のハニカムエレメントを内装し、該ハニカムエレメントを、前記流入、出側ケースに設けた締付け具で挿圧してなるエアクリーナにおいて、弾性を有する中空環状円筒部および該円筒部より大径の複数の環状凸条の中に液体を充填してなる緊締具に、外周に剛性を有し軽材質の薄肉円筒を被着したハニカムエレメントを挿入し、前記ハニカムエレメントと緊締具を、円筒内に同設した中央開口のストップ、円筒外に環状受圧面と複数のブラケットを備えた流出側ケースおよび円筒外に押圧部と複数のブラケットを備えた流入側ケースに内装し、前記複数のブラケットには締付け具を装着することを特徴とするハニカムエレメント内装のエアクリーナ。



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## 3. 考案の詳細な説明

本考案は、ハニカムエレメント内装のエアクリーナ、特にハニカムエレメントにかかる改良に関する。

第1図は、従来のハニカムエレメントEを内装したエアクリーナAの説明用断面図である。  
本例は、エア流入口Bを有する円筒状の流入側ケースCと、エア流出口Dを有する円筒状の流出側ケースF中に、ハニカムエレメントEを内装し、図示のように該ハニカムエレメントEの一端すなわちエア流入口B側に設けたエレメントガイドGのフランジ部KにパッキンP<sub>1</sub>を被覆し、流入、出側ケースC、Fに固設した複数のブレケットQ<sub>1</sub>、Q<sub>2</sub>を貫通した締付具Rを結付け、前記流入、出側ケースC、Fに設けたパッキン押えM、Nを押圧して前記フランジ部Kが挿着されている。そしてハニカムエレメントEの他端のエレメントガイドLの外周には、流出側ケースFの内径とは同様になるよう例えばテープ等が巻層されパッキンP<sub>2</sub>を形成し流出側ケー

スFの内側に密接するようにしている。しかしながらハニカムエレメントEは真円度の精度が低くパッキンP<sub>1</sub>も真円を保つことが難かしく、またパッキンP<sub>1</sub>を厚肉にするとハニカムエレメントEを流出側ケースFに押入しづらいのでパッキンP<sub>1</sub>は薄肉状態で挿入されている。第2図は第1図丸棒の拡大図でありエレメントガイドGは環状平板H、環状板J、フランジ部Kからなっているが、前記のようにパッキンP<sub>1</sub>と流出側ケースFの内側に隙間があると、エンジン回転等によるエアクリーナAの振動時には、ハニカムエレメントEはエレメントガイドGのフランジ部Kの付け根Sを支点として振幅を生じ第2図に示すように付け根Sに亀裂を生じ、その亀裂から吸入される塵埃が通過したり、亀裂が大きくなるとハニカムエレメントEがケース内で左右に変動するという欠点を有している。

この考案は上記欠点を解消するためのもので、弾性を有する中空環状円筒部および該円筒部より大きい径で、複数の環状凸条の中に液体を充

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填した緊締具に、外周に剛性を有し軽材質の薄肉円筒を被着したハニカムエレメントを挿入し、前記ハニカムエレメントと緊締具を、円筒内に固設した中央開口のストッバ、円筒外に環状受圧面と複数のブラケットを備えたエア流出口を有する流出側ケースおよび円筒外に押圧部と複数のブラケットを備えたエア流入口を有する流入側ケースに内装し、前記複数のブラケットを締付け具で締め付け前記緊締具の形状を変化させて液体に圧力を加え、ハニカムエレメントの外周を加圧して該エレメントを緊定するもので以下実施例を図面により説明する。

第3図は本考案によるエアクリーナ20の組付時の説明用縦断面図である。

ハニカムエレメント10は巻芯5に図示しない平板浜材と波形浜材を積重して巻層し、その終端を止着し、流路6に開端7閉端8を交互に形成した円筒状のものであり、さらにその外周には剛性を有する軽材質例えばアルミ材、硬質プラスチック製等の薄肉円筒9が被着されている。



そして上記ハニカムエレメント10は第4図の斜視図で示すような例えはゴム製等弾性を有する中空環状円筒部12および該円筒部12より径の大きい複数の環状凸条13の中に、例えはオイルやシリコン等の液体14(第3、第5図に示す)を密封充填した緊締具11の内側に挿入されている。第3図示のように上記ハニカムエレメント10と緊締具11は、エア流出口3を有する流出側ケース4に固設した中央開口のストッパ15に接触するまで挿入され、さらにエア流入口1を有する流入側ケース2のブラケット21の付いている方の円筒が、前記ハニカムエレメント10の他端側に挿入されている。

前記の時点では、緊締具11の中空環状円筒部12の外周は流出側ケース4の内径とは間隙を有しており、また環状凸条13の両端は、流入側ケース2の押圧部16の環状押圧面17と流出側ケース4の環状受圧面18に接触しているのみで緊締具11中の液体14には圧力は作用していない。

第5図は本考案の作用を説明するためのもの

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で流入、出側ケース2、4に固設した複数のブレケット21、22（下方の二点鎖線は想定線）を貫通する例えばハンガーボルトのような締付け具23を締付けた時の縦断面図である。流入側ケース2に設けた環状ストッパ19がブレケット22に接触するときには、緊締具11の環状凸条13は押圧されて接触するので液体14の容積がなくなり、弾性を有する緊締具11は液体14の圧力により変形する。すなわち締付け具23の締付け力により緊締具11の環状凸条13は環状押圧面17と環状受圧面18間に密着し、中空環状円筒部12はハニカムエレメント10の薄肉円筒9、ストッパ15、流出側ケース4の内側を加圧しながら密着する。上記により剛性を有する薄肉円筒9を被着したハニカムエレメント10は、環状押圧面17とストッパ15間に緊締具11内の液体14の圧力により緊定される。

以上説明したように本考案は、ハニカムエレメントの外周に弾性を有する軽材質の薄肉円筒を被着し、弾性を有する液体充填の緊締具に挿

入して、前記ハニカムエレメント、緊締具を、押圧部を設けた流入側ケースおよびストッバを固設した流出側ケースに挿入し、流入、出側ケースに固設したブラケット貫挿の締付け具で前記緊締具を変形加圧するようにしてハニカムエレメントを緊定するようにしたので、従来品の欠点を解消できるものであり、さらにハニカムエレメント清掃のため締付け具をゆるめて取外すときは、緊締具は原形に復帰するので恒久的に使用できる効果を有する。

#### 4. 図面の簡単な説明

第1図は従来品の説明用縦断面図、第2図は第1図の丸枠拡大図、第3図は本考案品組立時の縦断面図、第4図は緊締具の斜視図、第5図は本考案品を締付けたときの説明用縦断面図。

2 …… 流入側ケース	4 …… 流出側ケース
9 …… 薄肉円筒	10 …… ハニカムエレメント
11 …… 緊締具	12 …… 中央環状円筒部
13 …… 環状凸条	14 …… 液体
17 …… 環状押圧面	20 …… エアクリーナ

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21 …… 流入側 ブラケット

22 …… 流出側 ブラケット 23 …… 締付け具

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実用新案登録 出願人 株式会社 土屋製作所

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図1

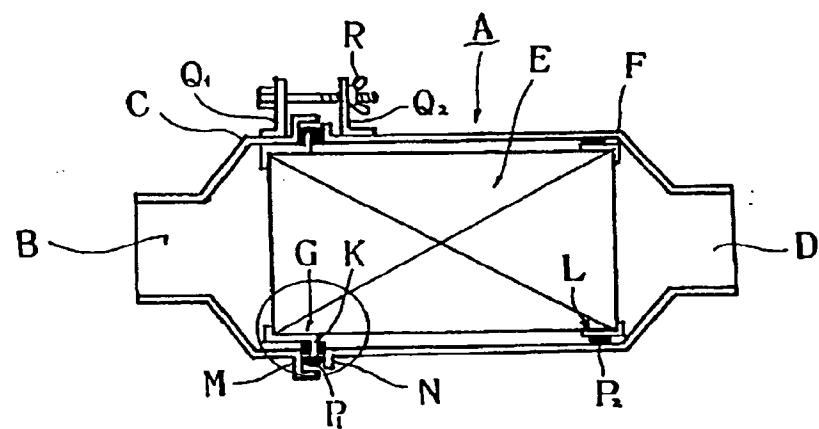


図2

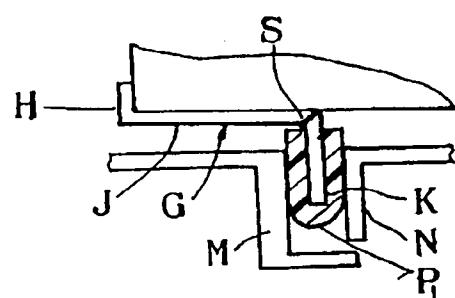
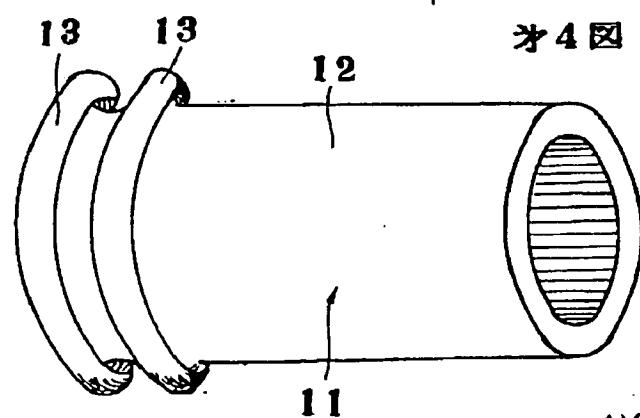


図4



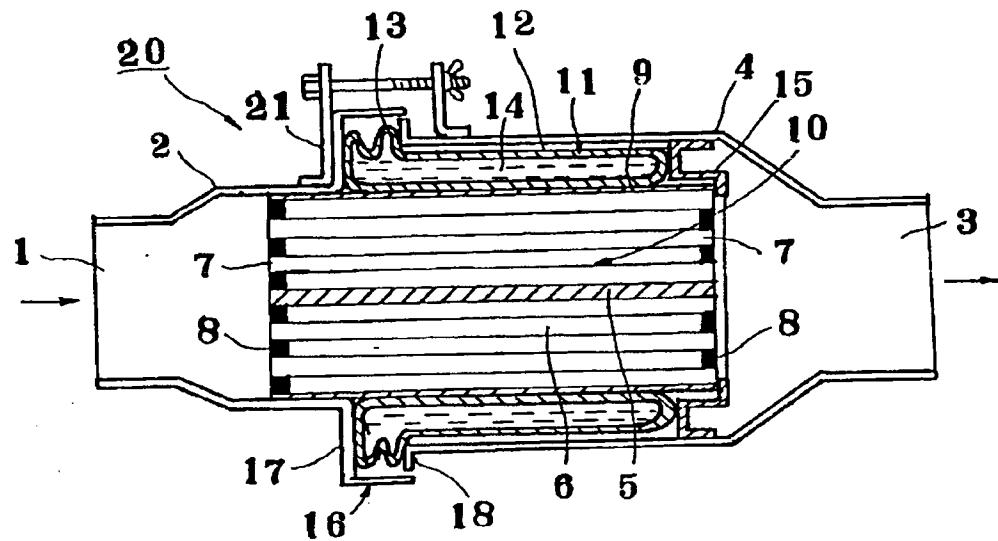
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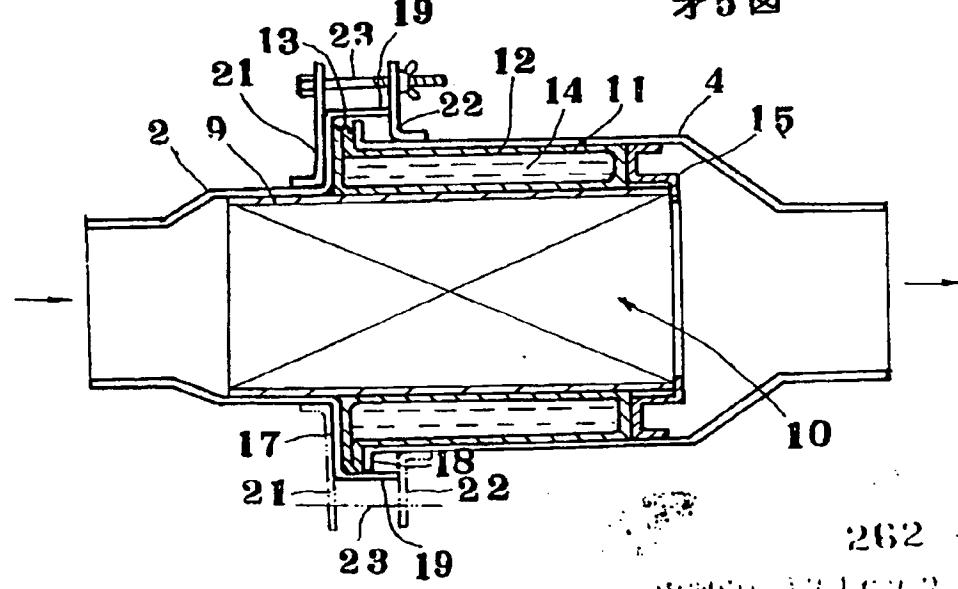
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第3図



第5図



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